

COSMIC AVENGER

Operation, Maintenance
and Service Manual



UNIVERSAL

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— WHEN ORDERING PARTS —

Since each component part is indicated by block, definitely specify both the corresponding Fig. No. and part No. within the Fig. when placing an order for it.

I. FEATURES OF THIS MACHINE

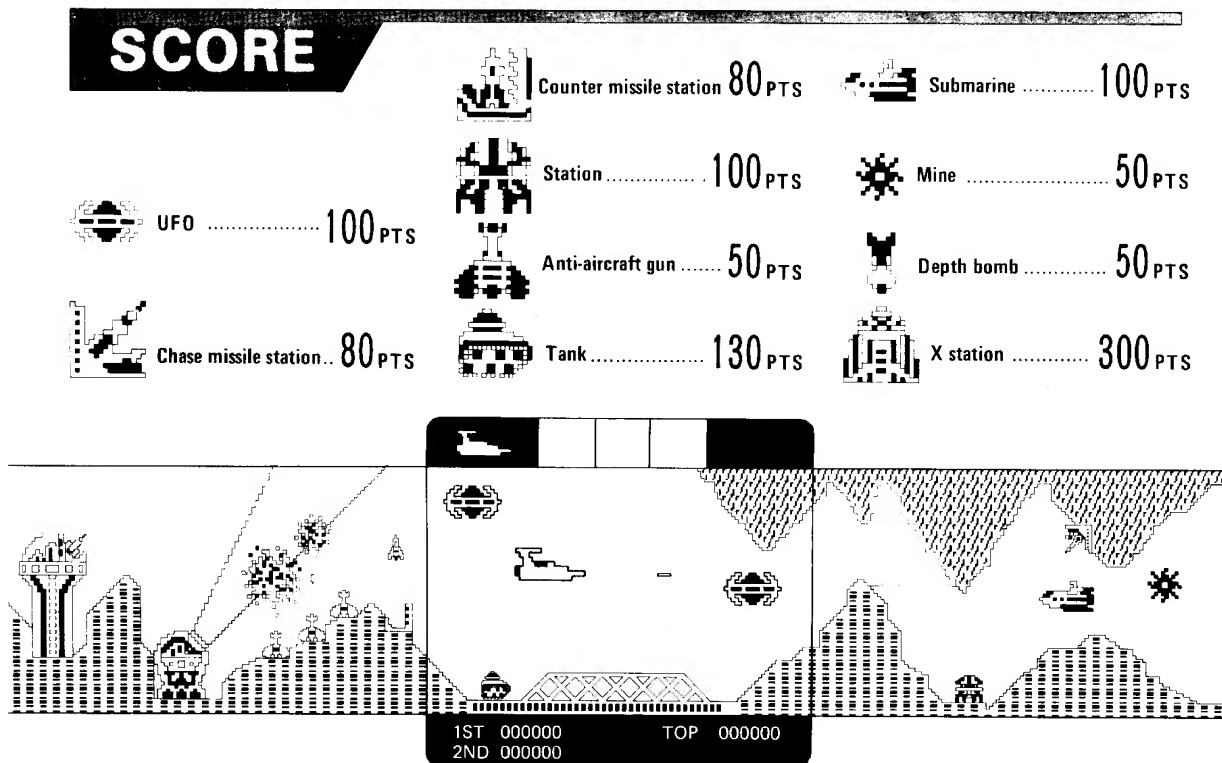
1. The game packs in excellent features captivating players.
2. The lever control system is simple to handle.
3. By combining dip switches you can select among a variety of game modes — the number of spaceships, extra score (bonus points), etc.
Additionally, by means of dip switches you can select among 4 degrees of difficulty in play.
4. Dip switch combinations are also available to cover almost all kinds of game charge settings.
5. The highest score for the day is always displayed on the screen, and the 5 highest scorers can enter their names on the screen as well (dip switch combinations are also available to select among different number of letters used to register player name).
6. Finely designed cabinet and fascinating acoustic effects.

II. HOW TO HANDLE AND MAINTAIN THIS MACHINE

1. Since the UNIVERSAL's COSMIC AVENGER employs a color TV receiving set, be careful not to shake it during transit and when carrying it about.
2. Install it at a location which is not exposed to direct sunlight. In order to prevent the inside temperature rising, avoid as much as possible a location near a heater, etc.
3. Since the grounding terminal is visible, be sure to connect it to a grounding conductor.
4. Insert the power cord into the outlet and turn on the switch.
5. Even if the solid-state module seems to be out of order, do not check the circuit by means of a circuit tester, etc., since the internal voltage of the tester, etc. may sometimes break down the IC.
6. Make sure the machine is well ventilated. If the temperature of the IC and transistor is lower than 60°C, the function normally and may be considered reliable. If it exceeds 60°C, their performance cannot be guaranteed.
7. Make sure that the connector, etc. are not disconnected.
8. Whenever connecting the power cord of the solid-state module to, or disconnecting it from, the outlet, be sure to turn the power off.
9. Although the products of UNIVERSAL are manufactured with the utmost care, they may develop malfunctions when used for long periods. So, be sure to check this machine daily.

III. HOW TO PLAY

1. Your "Avenger" can be moved in 8 directions. The speed increases as it advances, while it decreases as it retreats.
2. Destroy the front enemy by pressing the Fire Button, and destroy the target below by pressing the Bomb Button.
3. The enemy UFO will assault you flying either from in front of you or from behind you. You can locate it by using the radar.
4. A tough chase missile will pursue your Avenger persistently. Dodge it successfully, and you can cause the enemy to fight among themselves.
5. When you pass the enemy radar site, an anti-aircraft gun will fire at you according to the altitude of your Avenger.
6. When the screen advances further, the X station will appear. When you destroy it in good time, you can destroy all the targets appearing on the screen at once. You are then awarded a high score.
7. Your Avenger will be destroyed when it is affected by any explosion.
8. The 1st — 5th highest scorers for the day can enter their names on the screen.



IV. VARIOUS OPTIONAL SETTINGS

A. SERVICE SWITCHES AND DIP SWITCHES

• Dip Switch A

1. Number of Spaceships (SW1, 2)

| No. of Spaceships | SW1 | SW2 |
|-------------------|-----|-----|
| 3 Ships | OFF | OFF |
| 4 Ships | OFF | ON |
| 5 Ships | ON | OFF |
| 2 Ships | ON | ON |

2. Extra Score (SW3, 4)

| Extra Score | SW3 | SW4 |
|-------------|-----|-----|
| 5,000 PT | OFF | OFF |
| 8,000 PT | OFF | ON |
| 10,000 PT | ON | OFF |
| Nil | ON | ON |

3. Game Style (SW5)

| Style | SW5 |
|---------|-----|
| Table | OFF |
| Upright | ON |

4. Input Letters for High Score (SW6)

| No. of Letters | SW6 |
|----------------|-----|
| 0 ~ 10 Letters | OFF |
| 0 ~ 3 Letters | ON |

5. Difficulty of the Game (SW7, 8)

| Difficulty | SW7 | SW8 |
|------------|-----|-----|
| 1 | OFF | OFF |
| 2 | OFF | ON |
| 3 | ON | OFF |
| 4 | ON | ON |

• Positions of Volume Controller, Dip and Service Switches

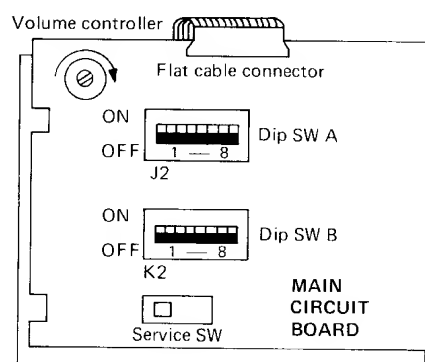


Fig. 1 Positions of Volume Controller, Dip and Service Switches

Service Switch

Pressing the service switch, the left-hand chute is set and the number of credit/s increases.

• Dip Switch B (Coin & Credit)

| Coin | Credit | Left-hand Chute | | | | Right-hand Chute | | | |
|------|--------|-----------------|-----|-----|-----|------------------|-----|-----|-----|
| | | SW1 | SW2 | SW3 | SW4 | SW5 | SW6 | SW7 | SW8 |
| 1 | 1 | OFF | OFF | OFF | OFF | OFF | OFF | OFF | OFF |
| 1 | 2 | OFF | OFF | OFF | ON | OFF | OFF | OFF | ON |
| 1 | 3 | OFF | OFF | ON | OFF | OFF | OFF | ON | OFF |
| 1 | 4 | OFF | OFF | ON | ON | OFF | OFF | ON | ON |
| 1 | 5 | OFF | ON | OFF | OFF | OFF | ON | OFF | OFF |
| 2 | 1 | OFF | ON | OFF | ON | OFF | ON | OFF | ON |
| 2 | 2 | OFF | ON | ON | OFF | OFF | ON | ON | OFF |
| 3 | 1 | OFF | ON | ON | ON | OFF | ON | ON | ON |
| 3 | 2 | ON | OFF | OFF | OFF | ON | OFF | OFF | OFF |
| 4 | 1 | ON | OFF | OFF | ON | ON | OFF | OFF | ON |
| 1 | 1 | ON | OFF | ON | OFF | ON | OFF | ON | OFF |
| 1 | 1 | ON | OFF | ON | ON | ON | OFF | ON | ON |
| 1 | 1 | ON | ON | OFF | OFF | ON | ON | OFF | OFF |
| 1 | 1 | ON | ON | OFF | ON | ON | ON | OFF | ON |
| 1 | 1 | ON | ON | ON | OFF | ON | ON | ON | OFF |
| 1 | 1 | ON | ON | ON | ON | ON | ON | ON | ON |

V. TV MONITOR

A. ADJUSTMENT OF TV PICTURE SCREEN

UPRIGHT TYPE

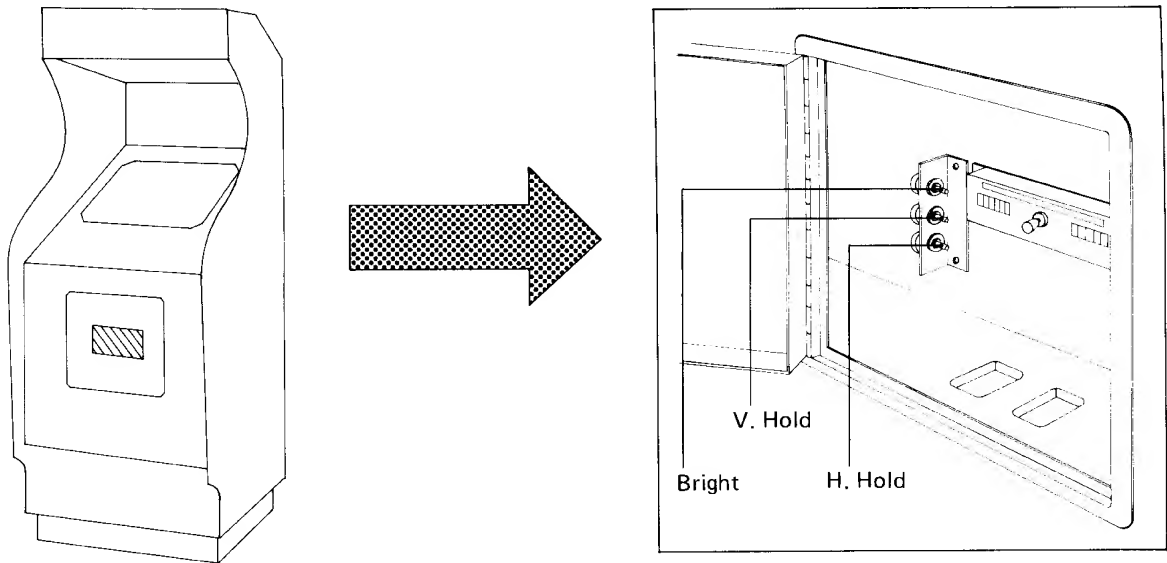


Fig. 2 Positions of TV Monitor Controller (Upright Type)

TABLE TYPE

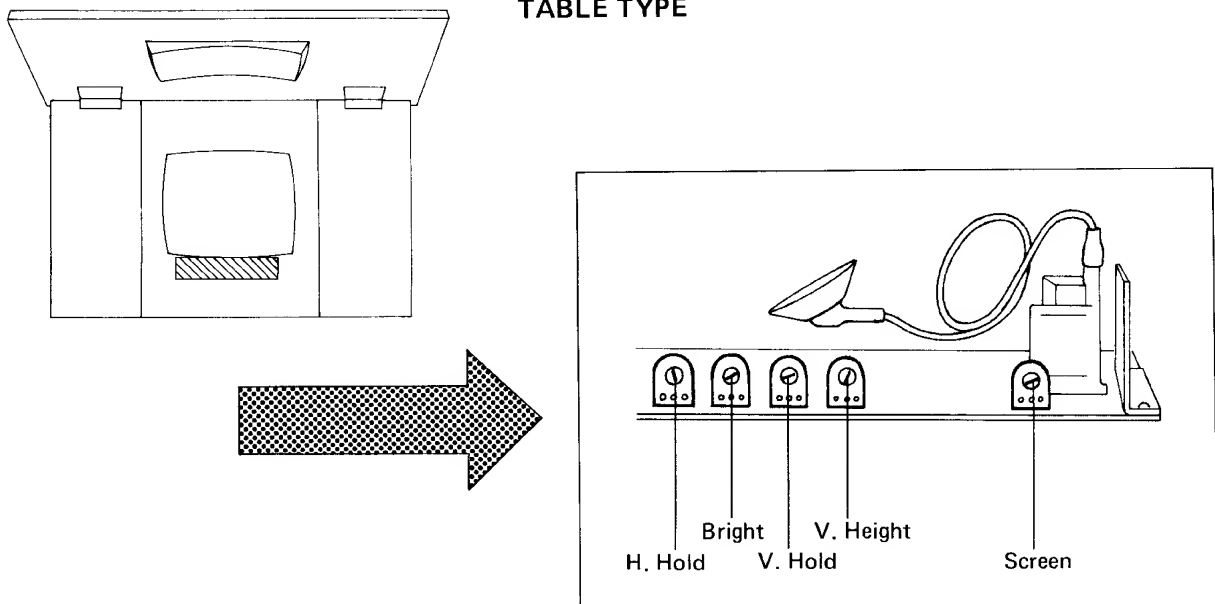
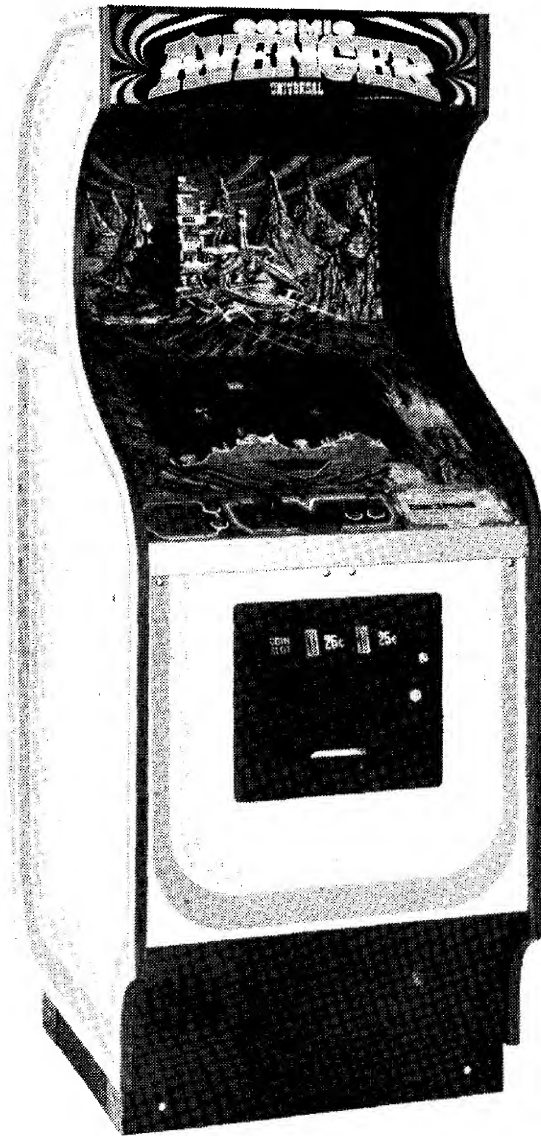


Fig. 3 Positions of TV Monitor Controller (Table Type)

UPRIGHT TYPE



This documentation provides standard information.
Universal reserves the right to change without notice.

VI. UPRIGHT TYPE PARTS CATALOG

A. COMPONENT PARTS RELATED TO CABINET (OUTSIDE)

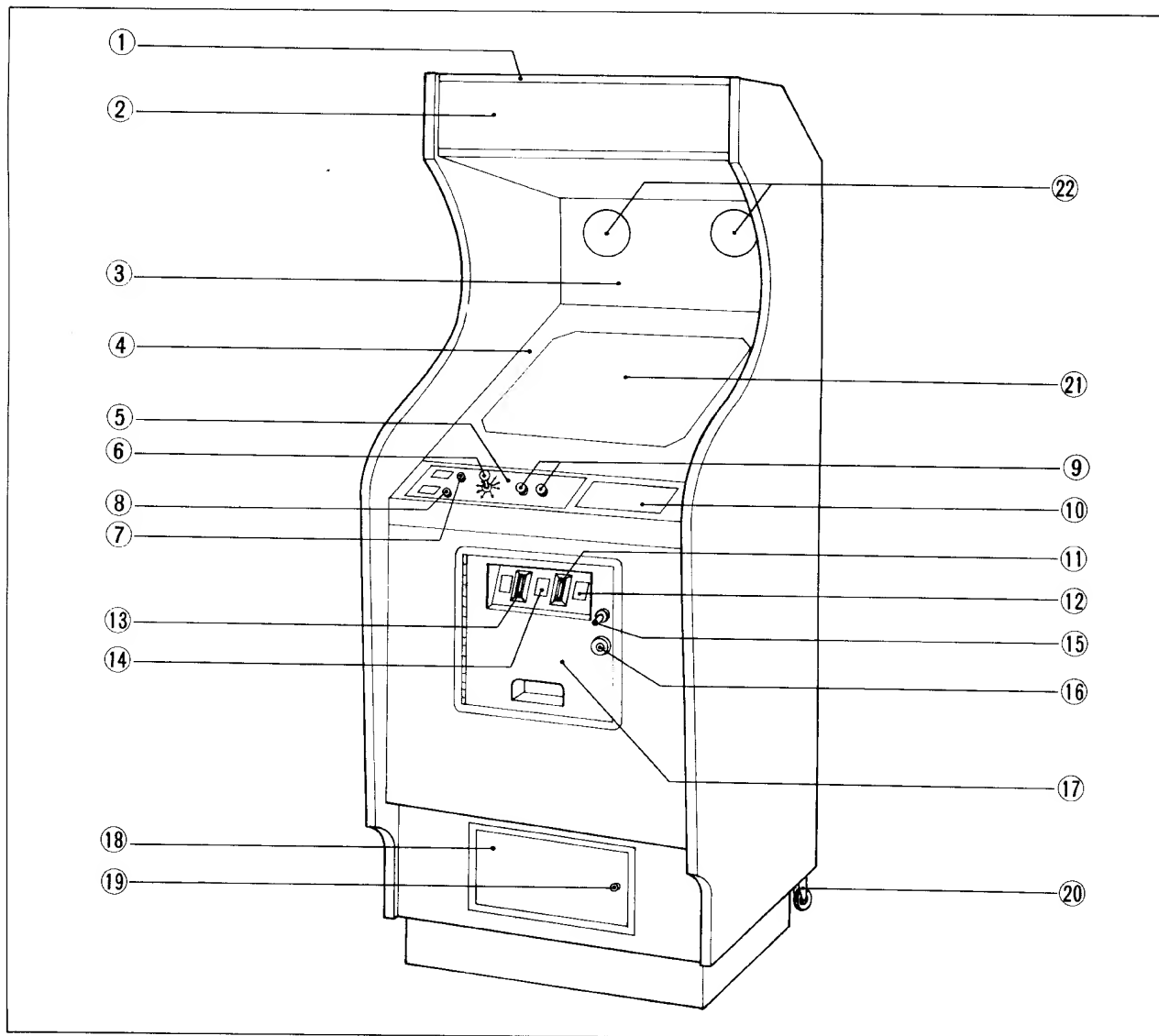


Fig. 4 Component Parts Related to Cabinet (Outside)

OUTSIDE CABINET PARTS LIST

| Ref. No. | Name | Ref. No. | Name |
|----------|------------------------------|----------|---------------------------|
| 1 | Title panel fixture | 12 | Coin indication panel (1) |
| 2 | Title panel | 13 | Coin slot (2) |
| 3 | Illustrated glass (B) | 14 | Coin indication panel (2) |
| 4 | Illustrated glass (A) | 15 | Cancel button |
| 5 | Operating indication panel | 16 | Door key |
| 6 | Control lever (general name) | 17 | Main door |
| 7 | Push button (for 1 player) | 18 | Cash box door |
| 8 | Push button (for 2 players) | 19 | Cash box door key |
| 9 | Push button (fire and bomb) | 20 | Caster |
| 10 | Sticker for game rules | 21 | CRT (20" color) |
| 11 | Coin slot (1) | 22 | Speaker (x 2) |

B. DRAWING OF CIRCUIT BOARD MOUNTING POSITIONS

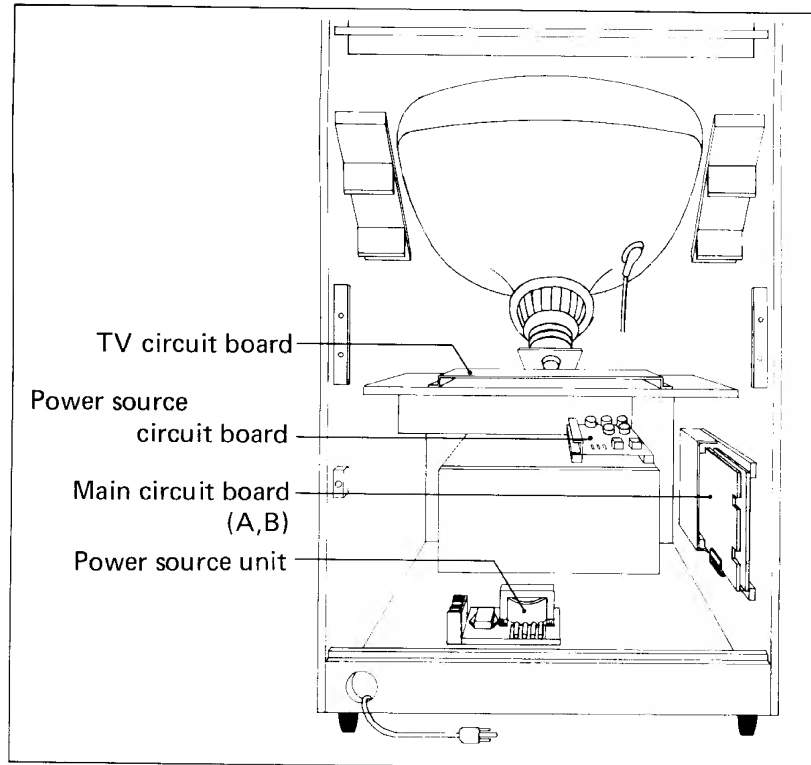


Fig. 5 Circuit Board Mounting Positions

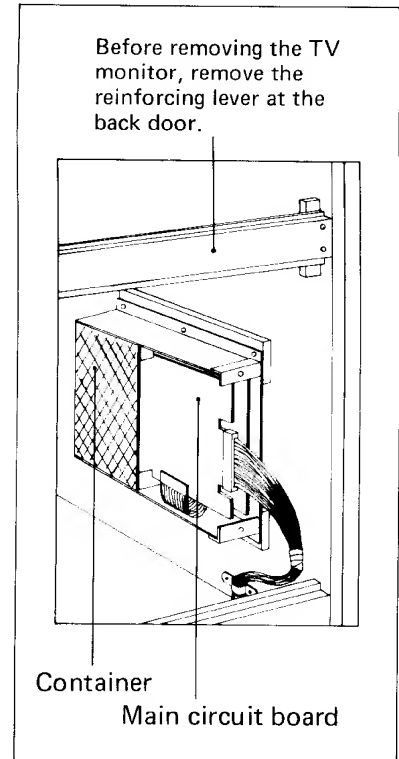


Fig. 6 Side View of Circuit Board Mounting Positions

C. FUSES

Fuses in the power source unit

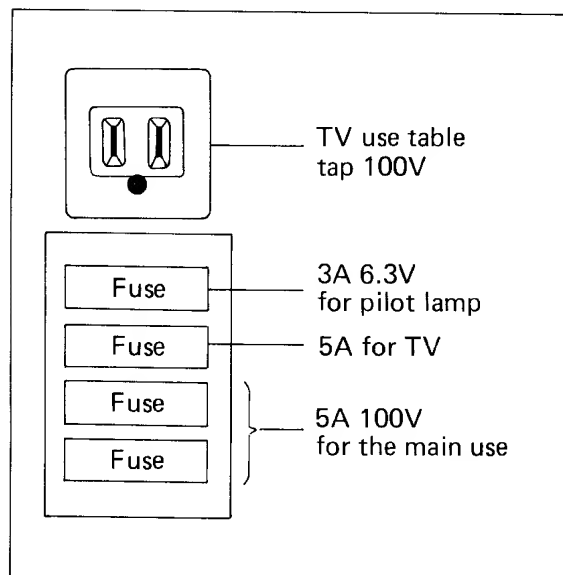


Fig. 7 Fuses in the Power Source Unit

Fuses in the power circuit board

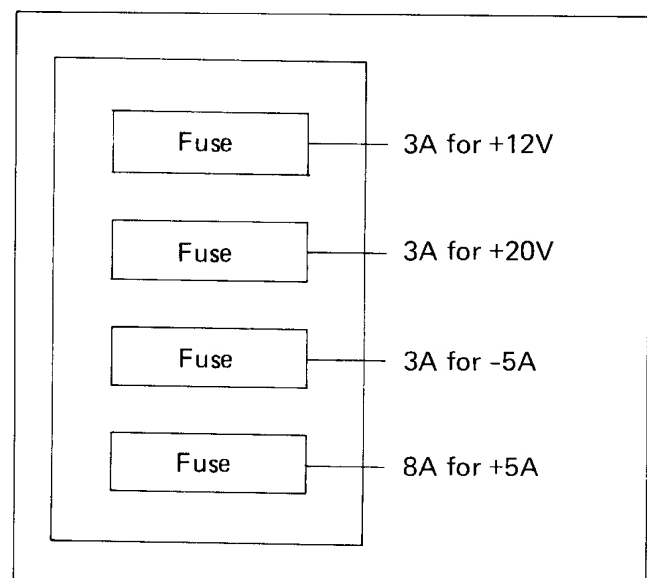


Fig. 8 Fuses in the Power Circuit Board

D. COMPONENT PARTS RELATED TO CABINET (INSIDE)

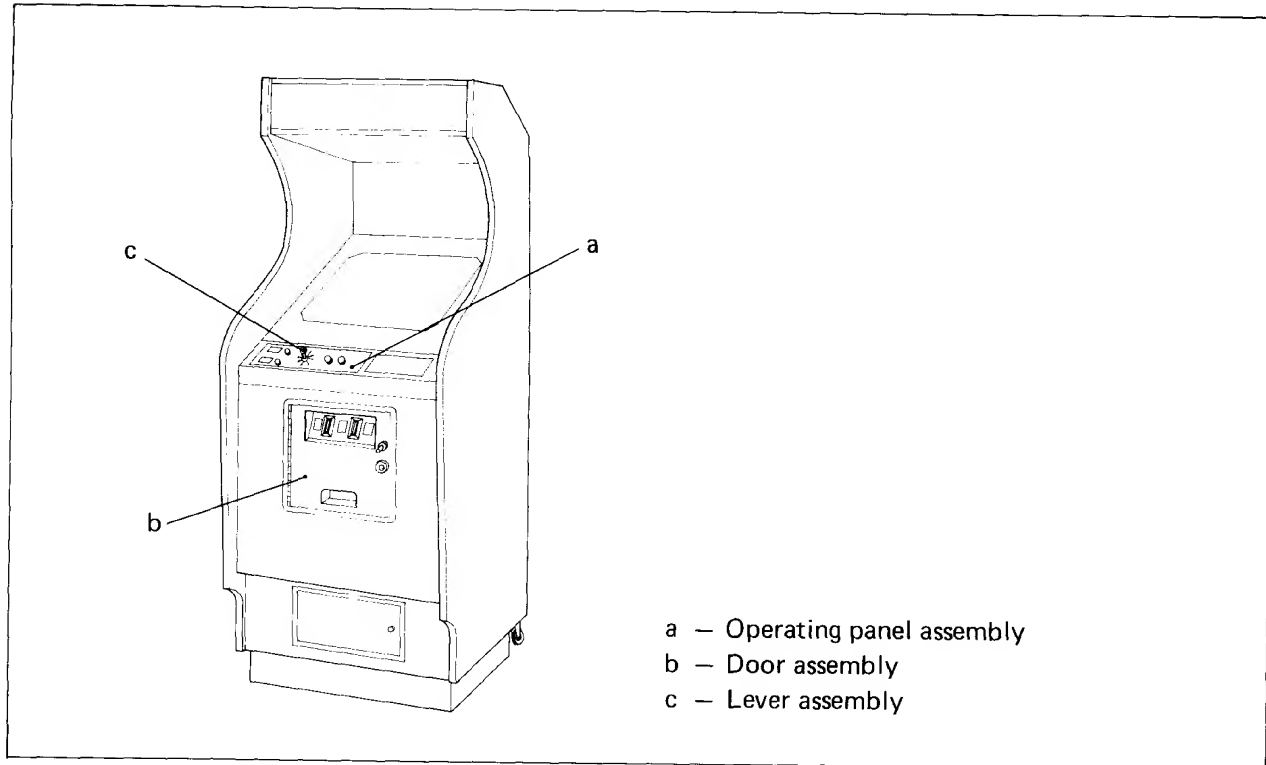


Fig. 9 Main Assemblies Related to Cabinet (Inside)

a) Operating panel assembly

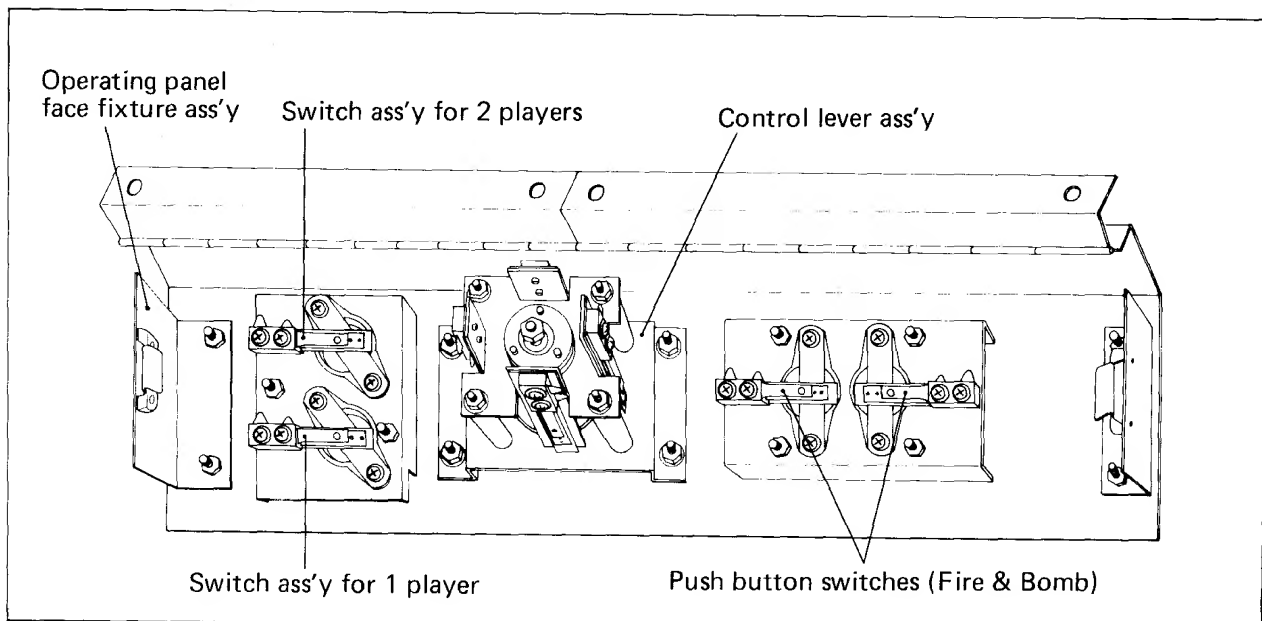


Fig. 10 Operating Panel Assembly

b) Door assembly and parts list

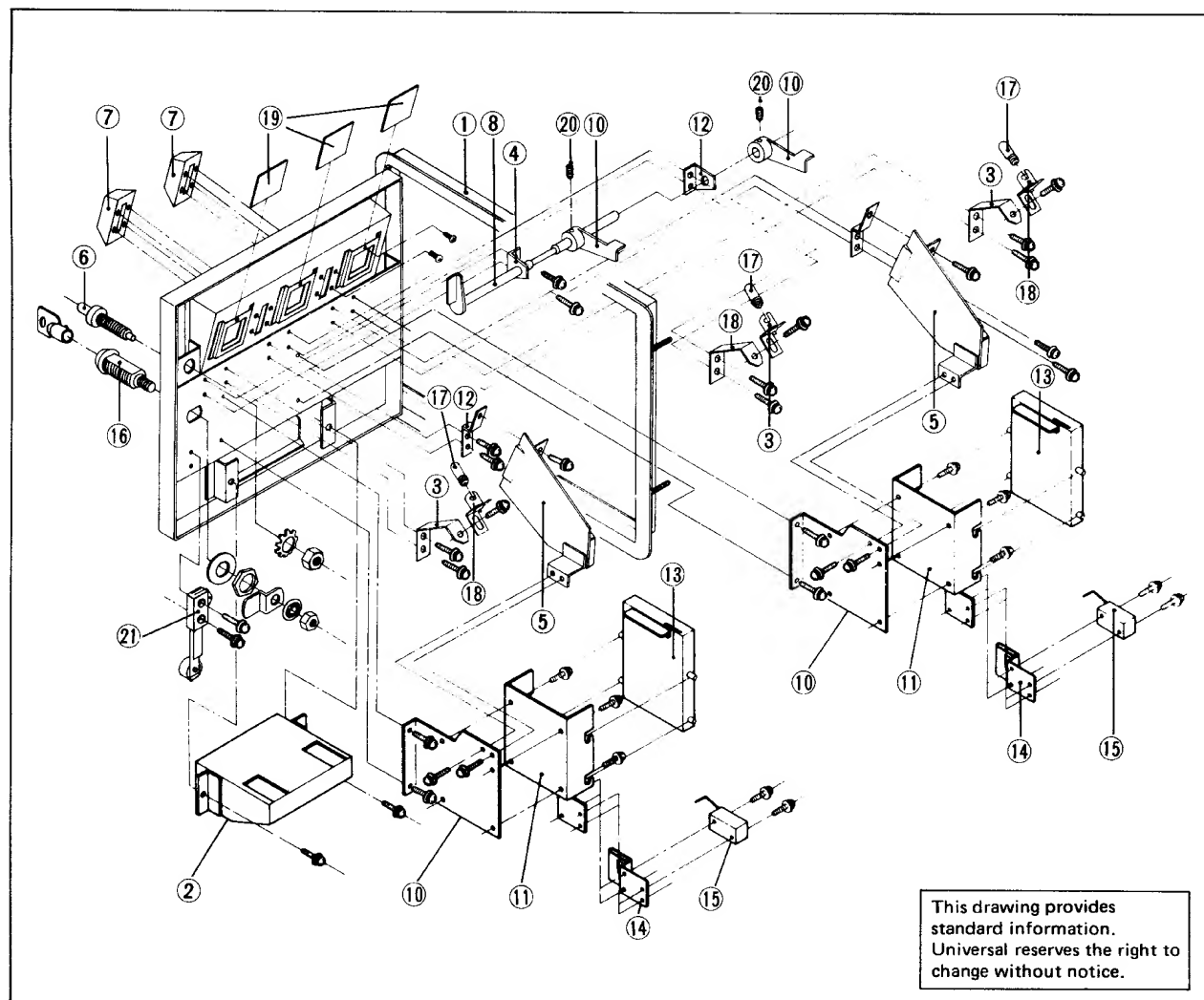


Fig. 11 Inside View of Door Assembly

DOOR ASSEMBLY PARTS LIST

| Ref. No. | Name | Ref. No. | Name |
|----------|------------------------|----------|--|
| 1 | Main door | 12 | Coin slot chute holder (x 2) |
| 2 | Returning saucer | 13 | Rejector (x 2) |
| 3 | Lamp bracket (x 3) | 14 | Sensor slot (x 2) |
| 4 | Rearing (x 2) | 15 | Micro switch |
| 5 | Coin slot chute (x 2) | 16 | Key sets |
| 6 | Returning button | 17 | Miniature lamp (x 3) |
| 7 | Coin slot (x 2) | 18 | Miniature lamp socket (x 3) |
| 8 | Transmission shaft | 19 | Coin indication panel (25φ x 2, coin slot) |
| 9 | Rotary bracket (x 2) | 20 | Hexagon socket head screw (x 2) |
| 10 | Rejector bracket (x 2) | 21 | Tilt switch |
| 11 | Rejector case (x 2) | | |

c) Lever assembly and parts list

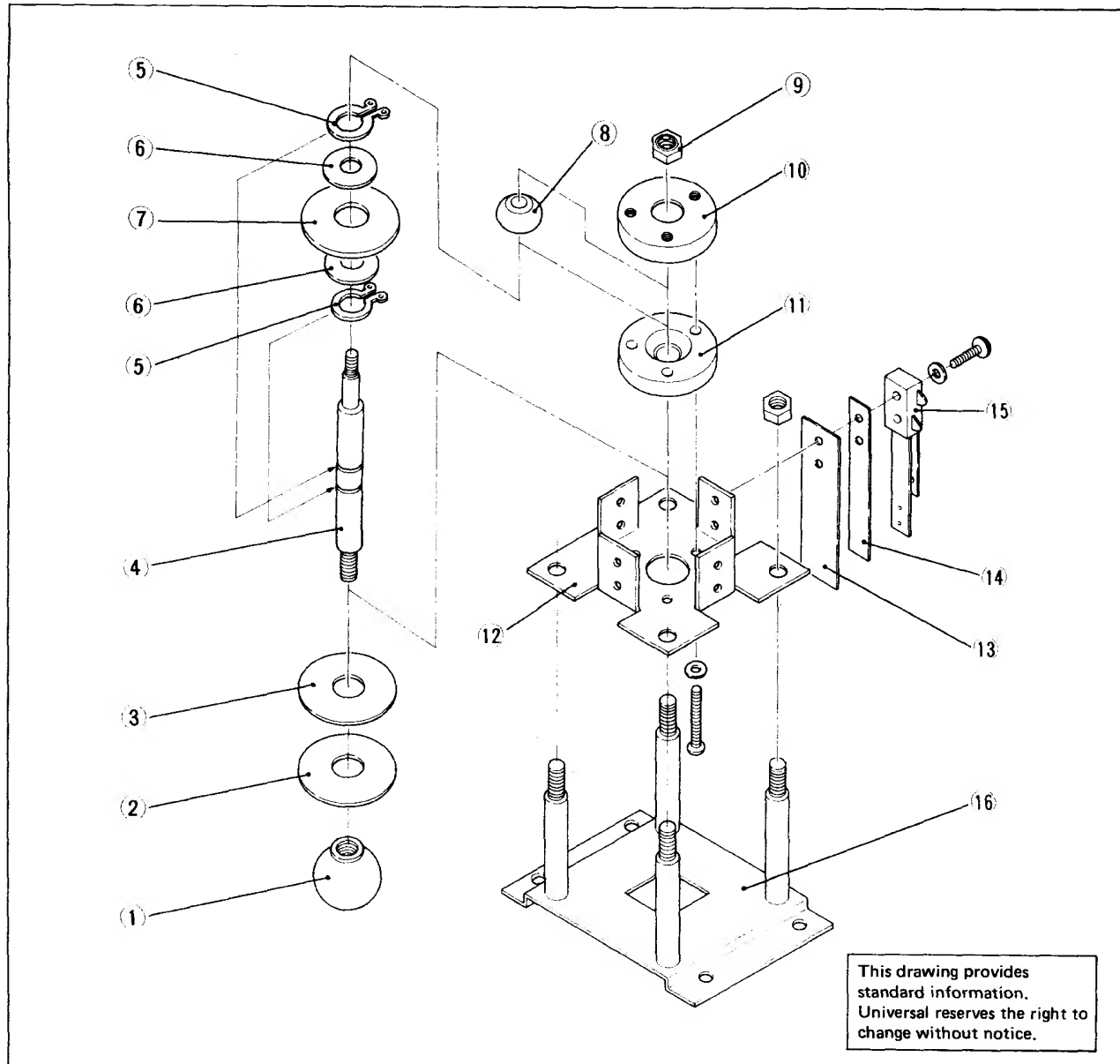


Fig. 12 Lever Assembly

LEVER ASSEMBLY PARTS LIST

| Ref. No. | Name | Ref. No. | Name |
|----------|-------------------------------------|----------|-----------------------|
| 1 | Knob (upright 32Dim., Table 24Dim.) | 9 | Lock nut |
| 2 | Resin board (transparent) | 10 | Bracket (A) |
| 3 | Resin board (black) | 11 | Bracket (B) |
| 4 | Lever shaft | 12 | Blades mounting plate |
| 5 | Returning rings (C type) | 13 | Plate spring |
| 6 | Flat washer | 14 | Insulating fiber |
| 7 | Detecting dice | 15 | Blades switch |
| 8 | Steel ball | 16 | Mounting base |

E. COMPONENT PARTS RELATED TO SWITCHES IN THE CABINET

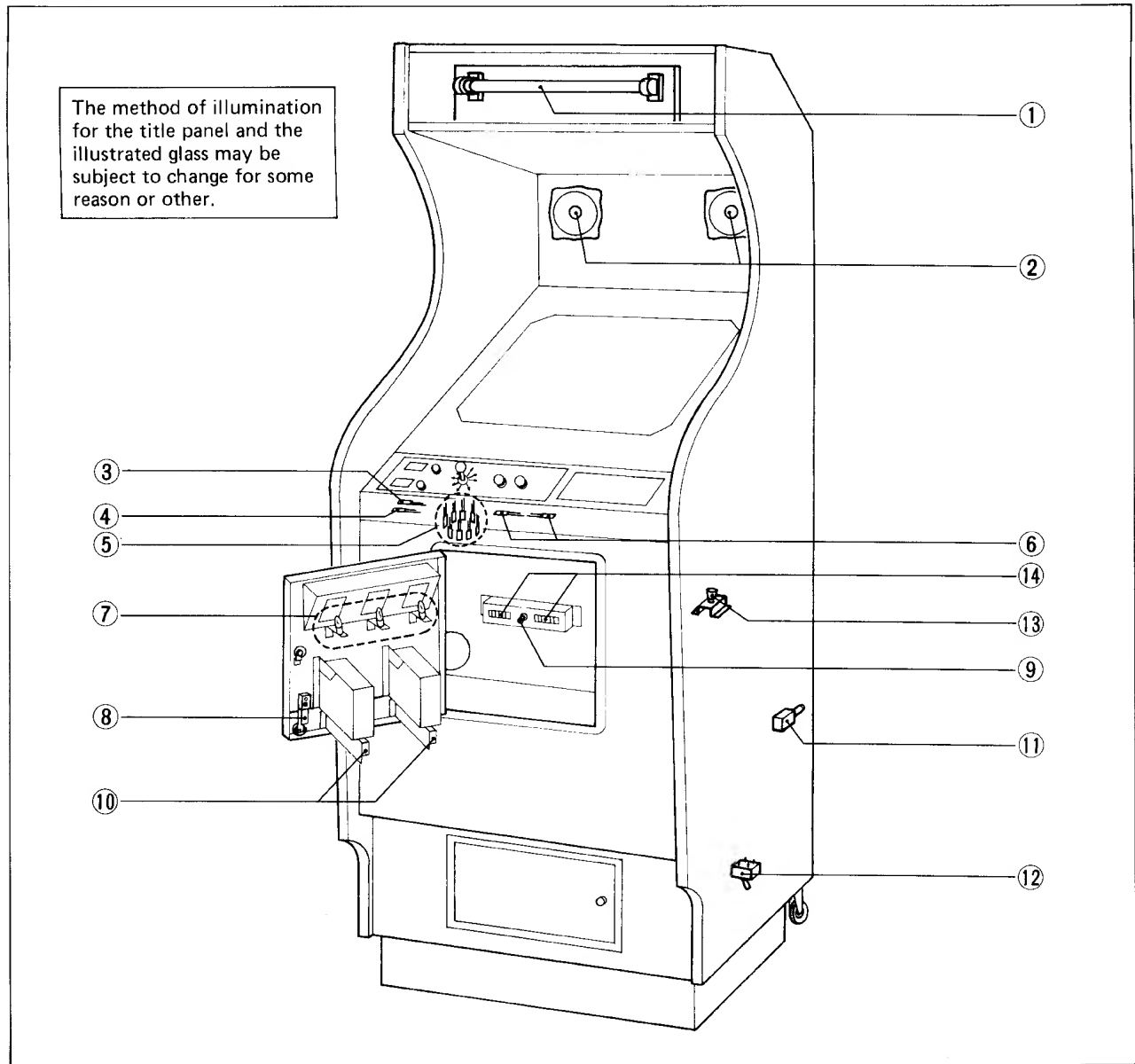
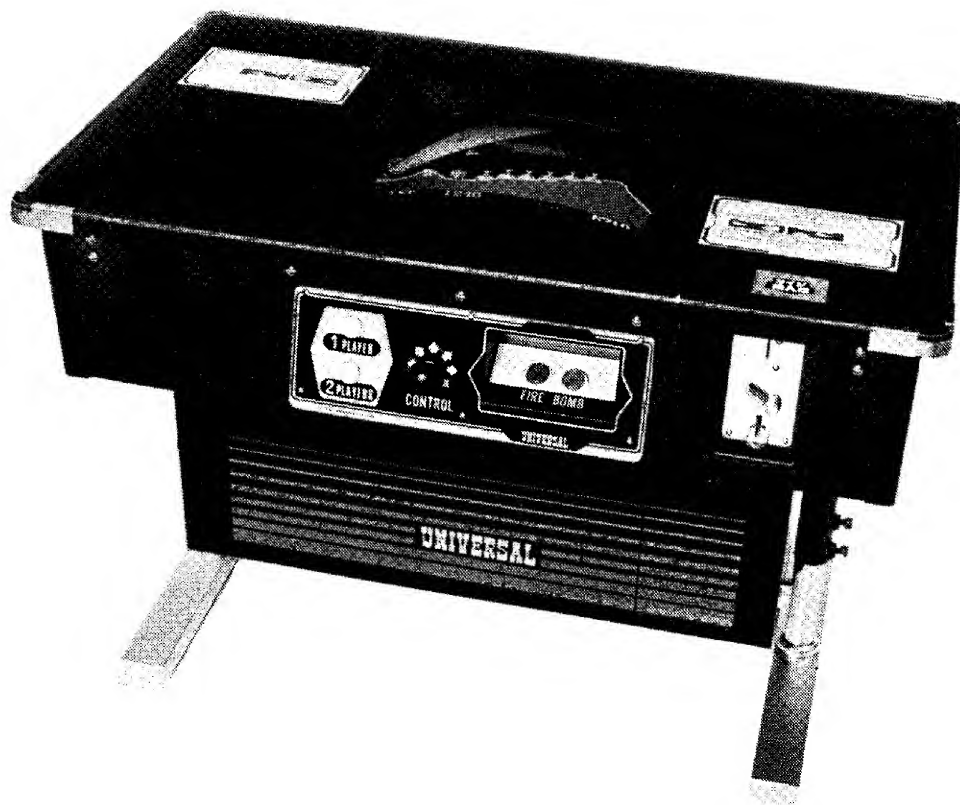


Fig. 13 Component Parts Related to Switches in the Cabinet

INSIDE CABINET PARTS LIST

| Ref. No. | Name | Ref. No. | Name |
|----------|---|----------|--------------------------------|
| 1 | Fluorescent lamp (for title panel) | 8 | Blade SW (for tilt SW) |
| 2 | Speaker (x 2) | 9 | Micro SW (for resetting) |
| 3 | 1 player select button blade SW | 10 | Micro SW (for rejector x 2) |
| 4 | 2 players select button blade SW | 11 | Door SW |
| 5 | Control lever 8-directional use blade SW (x8) | 12 | Toggle SW |
| 6 | Blade SW for fire and bomb | 13 | Micro SW (for demagnetization) |
| 7 | Miniature lamp (for money display x 3) | 14 | Coin counter (x 2) |

TABLE TYPE



This documentation provides standard information.
Universal reserves the right to change without notice.

VII. TABLE TYPE PARTS CATALOG

A. COMPONENT PARTS RELATED TO CABINET (OUTSIDE)

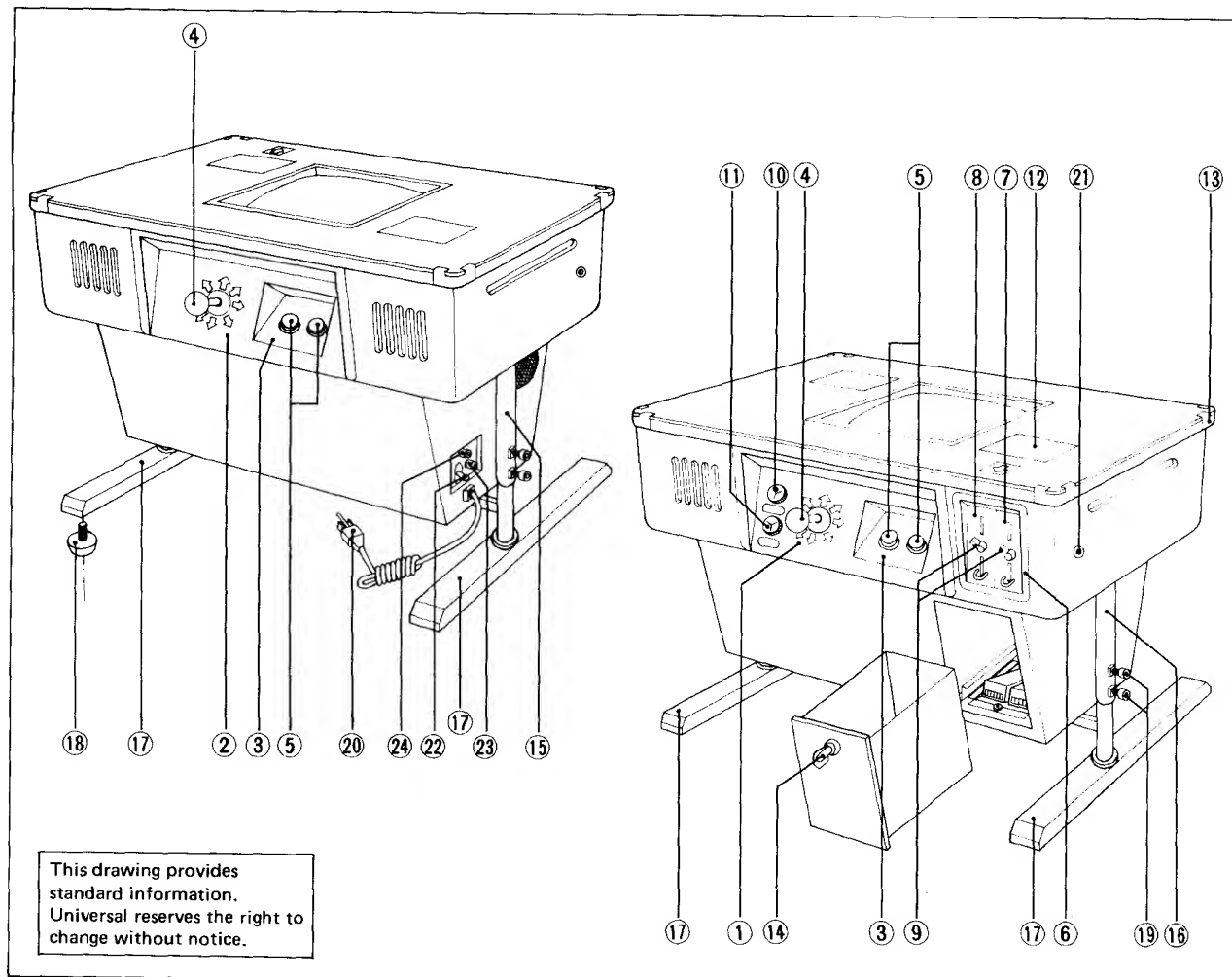


Fig. 14 Component Parts Related to Cabinet (Outside)

OUTSIDE CABINET PARTS LIST

| Ref. No. | Name | Ref. No. | Name |
|----------|--|----------|------------------------------|
| 1 | Operating indication illustrated panel A (for 1st player side) | 12 | Sticker for game rules (x 2) |
| 2 | Operating indication illustrated panel B (for 2nd player side) | 13 | Glass fittings (x 4) |
| 3 | Operating indication illustrated panel C | 14 | Cash box key |
| 4 | Control lever ass'y | 15 | Leg (left) |
| 5 | Push button (for fire and bomb) | 16 | Leg (right) |
| 6 | Coin slot frame | 17 | Foot |
| 7 | Selector plate (1) | 18 | Leg adjuster |
| 8 | Selector plate (2) [not used in case of 1-way] | 19 | Thumbscrew (x 4) |
| 9 | Cancel lever | 20 | Power cord (AC) |
| 10 | Push button ass'y (for 1 player) | 21 | Table key (x 2) |
| 11 | Push button ass'y (for 2 players) | 22 | Toggle SW (Main) |
| | | 23 | Fuse (3A for power input) |
| | | 24 | Earth jack |

B. COMPONENT PARTS RELATED TO CABINET (INSIDE)

a) Inside cabinet

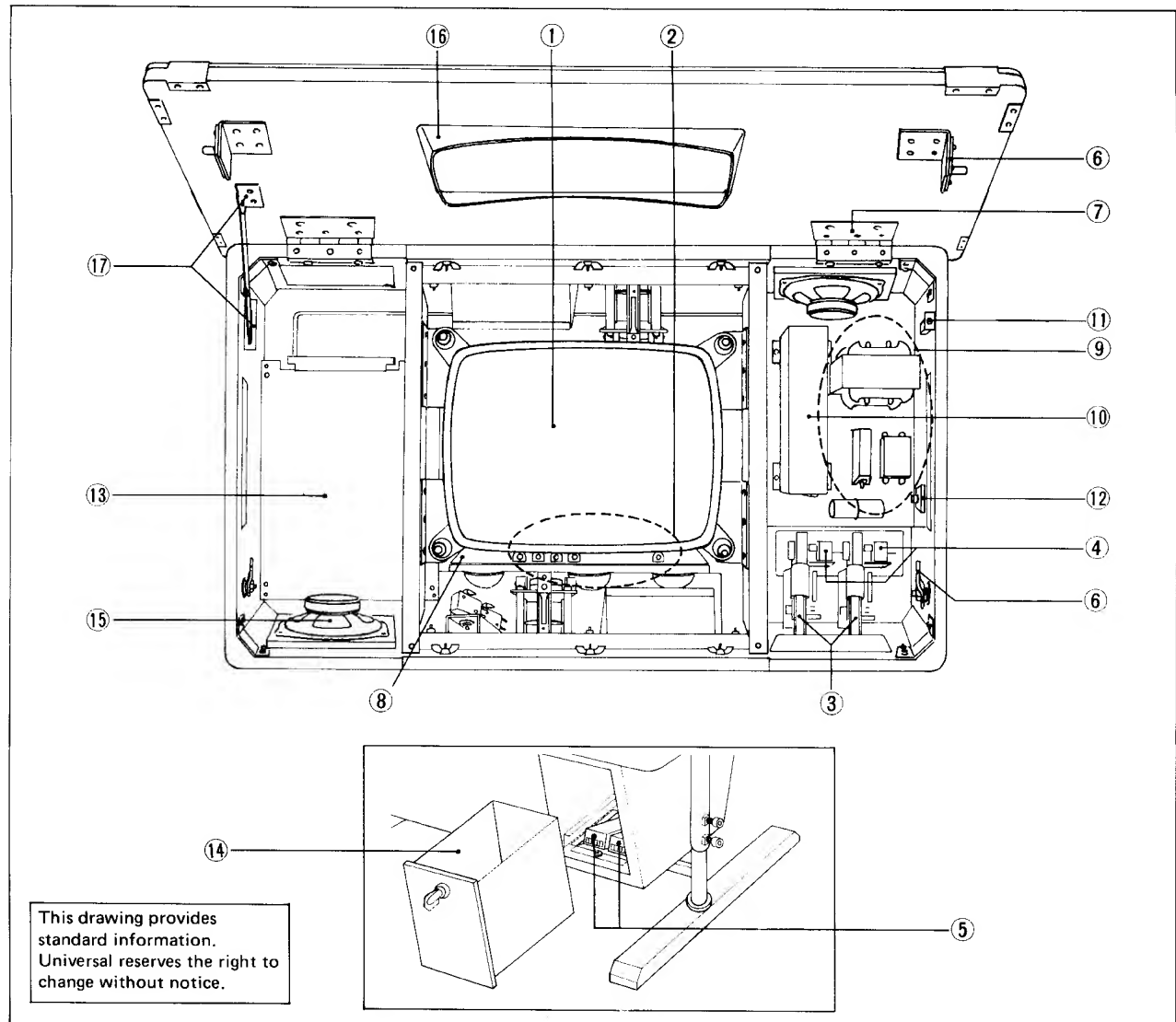


Fig. 15 Component Parts Related to Cabinet (Inside)

INSIDE CABINET PARTS LIST

| Ref. No. | Name | Ref. No. | Name |
|----------|----------------------------|----------|---------------------------|
| 1 | CRT (14" color) | 10 | Power supply unit |
| 2 | TV monitor control | 11 | Door switch |
| 3 | Rejector ass'y | 12 | Demagnetization switch |
| 4 | Coin micro switch | 13 | Main circuit board (A, B) |
| 5 | Coin counter | 14 | Cash box |
| 6 | Table lock mechanism ass'y | 15 | Speaker (x 2) |
| 7 | Butterfly plate ass'y | 16 | TV monitor mask |
| 8 | TV monitor circuit board | 17 | Hood guide ass'y |
| 9 | Power source unit | | |

b) Fuses

Fuses in the power source unit and power circuit board

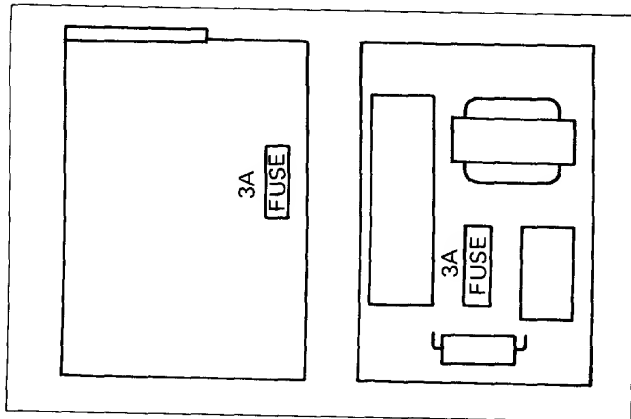


Fig. 16 Fuses in the Power Source Unit and Power Circuit Board

Fuse on the cabinet side

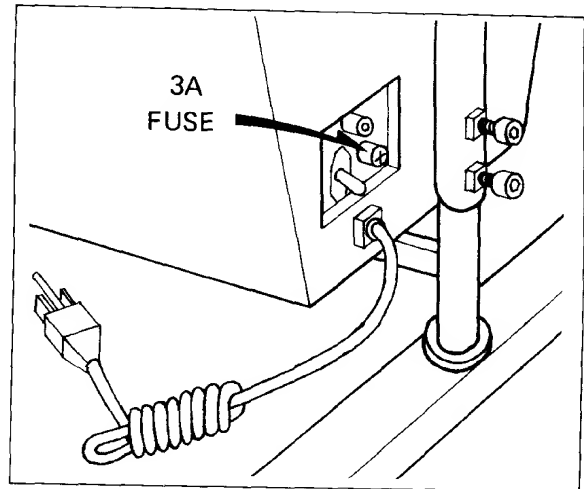


Fig. 17 Fuse on the Cabinet Side

c) Operating panel assembly

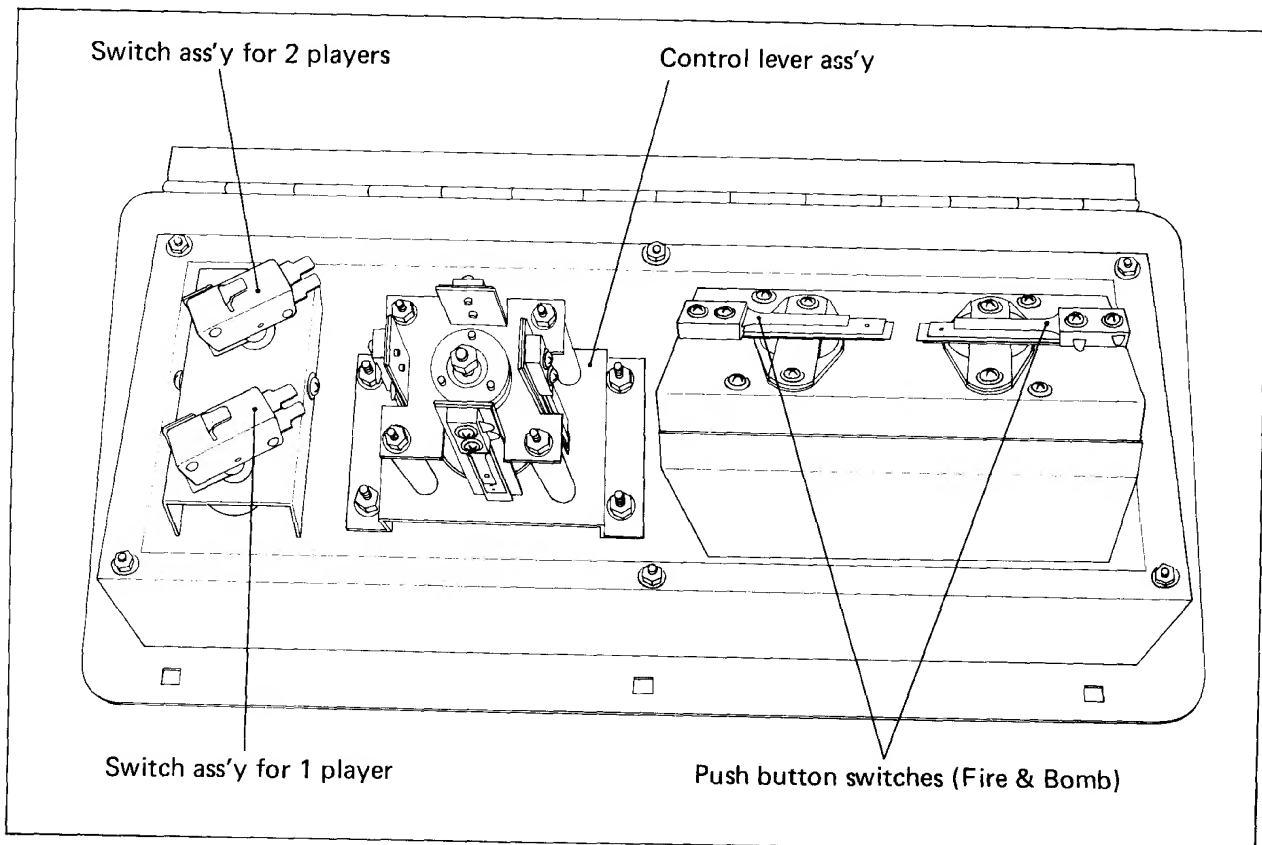


Fig. 18 Operating Panel Assembly

[1] Integrated Circuit

| Item No. | Q'ty | Description |
|------------------------|------|--|
| 74LS 00 | 3 | TTL |
| 74LS 02 | 3 | " |
| 74LS 04 | 5 | " |
| 74 04 | 1 | " |
| 74 S 04 | 1 | " |
| 74LS 08 | 11 | " |
| 74LS 10 | 2 | " |
| 74LS 20 | 1 | " |
| 74LS 27 | 1 | " |
| 74LS 32 | 3 | " |
| 74LS 42 | 1 | " |
| 74LS 74 | 9 | " |
| 74LS 86 | 7 | " |
| 74LS107 | 2 | " |
| 74LS138 | 3 | " |
| 74LS151 | 2 | " |
| 74LS153 | 4 | " |
| 74LS155 | 1 | " |
| 74LS157 | 13 | " |
| 74LS161 | 9 | " |
| 74LS166 | 2 | " |
| 74LS174 | 6 | " |
| 74LS175 | 2 | " |
| 74LS244 | 2 | " |
| 74LS245 | 1 | " |
| 74LS253 | 5 | " |
| 74LS259 | 1 | " |
| 74LS273 | 8 | " |
| 74LS283 | 4 | " |
| 74 S288 (TBP18S030) | 3 | 256 bits Bipolar RAM |
| 74LS393 | 2 | TTL |
| 74LS395 | 5 | " |
| NE555 | 1 | Timer |
| NE556 | 1 | " |
| Z80A | 1 | Nch MOS CPU (4MHz) |
| 2732 | 3 | Nch MOS 32K bits EP ROM (Access 450nsec) |
| 2732-35 | 5 | Nch MOS 32K bits EP ROM (Access 350nsec) |
| 2114 | 8 | Nch MOS 4K bits Static RAM (Access 450nsec) |
| 2114-2 | 9 | Nch MOS 4K bits Static RAM (Access 250nsec) |
| SN76489 | 2 | Sound Generation Controller |
| LM324 | 1 | Quad Operational Amplifiers |
| MB3730 | 1 | Power Amplifiers |
| MA7805 | 1 | Regulator |

[2] Other Semiconductor Devices

| Item No. | Q'ty | Description |
|----------|------|-------------|
| TLR103 | 1 | LED |
| 10D1 | 6 | Diode |

[3] Capacitors

| Rating | Q'ty | Description |
|-----------|------|--------------------|
| 100P1/12V | 2 | Ceramic Capacitor |
| 0.001μ/ " | 1 | " |
| 0.01μ/ " | 2 | " |
| 0.1μ / " | 54 | " |
| 0.1μ/25V | 3 | " |
| 1μ/25V | 1 | Chemical Capacitor |
| 47μ/25 | 2 | " |
| 4.7μ/25V | 2 | " |
| 10μ/ " | 2 | " |
| 22μ/ " | 1 | " |
| 220μ/ " | 4 | " |
| 470μ/ " | 2 | " |

[4] Registers

| Rating | Q'ty | Description |
|---------------------|------|------------------------------|
| 20Ω¼W | 1 | Carbon Solid |
| 2KΩ¼W | 2 | " |
| 100Ω¼W | 2 | " |
| 4.7Ω " | 2 | " |
| 47Ω " | 1 | " |
| 220Ω " | 18 | " |
| 330Ω " | 2 | " |
| 470Ω " | 6 | " |
| 510Ω " | 4 | " |
| 1KΩ " | 1 | " |
| 4.7KΩ " | 1 | " |
| 5.1KΩ " | 1 | " |
| 10KΩ " | 2 | " |
| 47KΩ " | 1 | " |
| 51KΩ " | 1 | " |
| 100KΩ " | 3 | " |
| MS1028AM | 8 | 1KΩ Register Array |
| MS1024AM | 1 | " |
| MS1038AM | 2 | 10KΩ Register Array |
| RV16YP or RGP102 | 1 | 1KΩ (B) Variable Register |

[5] Misc

| Name | Q'ty | Description |
|---------|------|-------------------------|
| Dip SW | 2 | 8 Elements Switch Array |
| X tal | 2 | 9.828MHz 4.000MHz |
| E61-00A | 1 | Micro SW |

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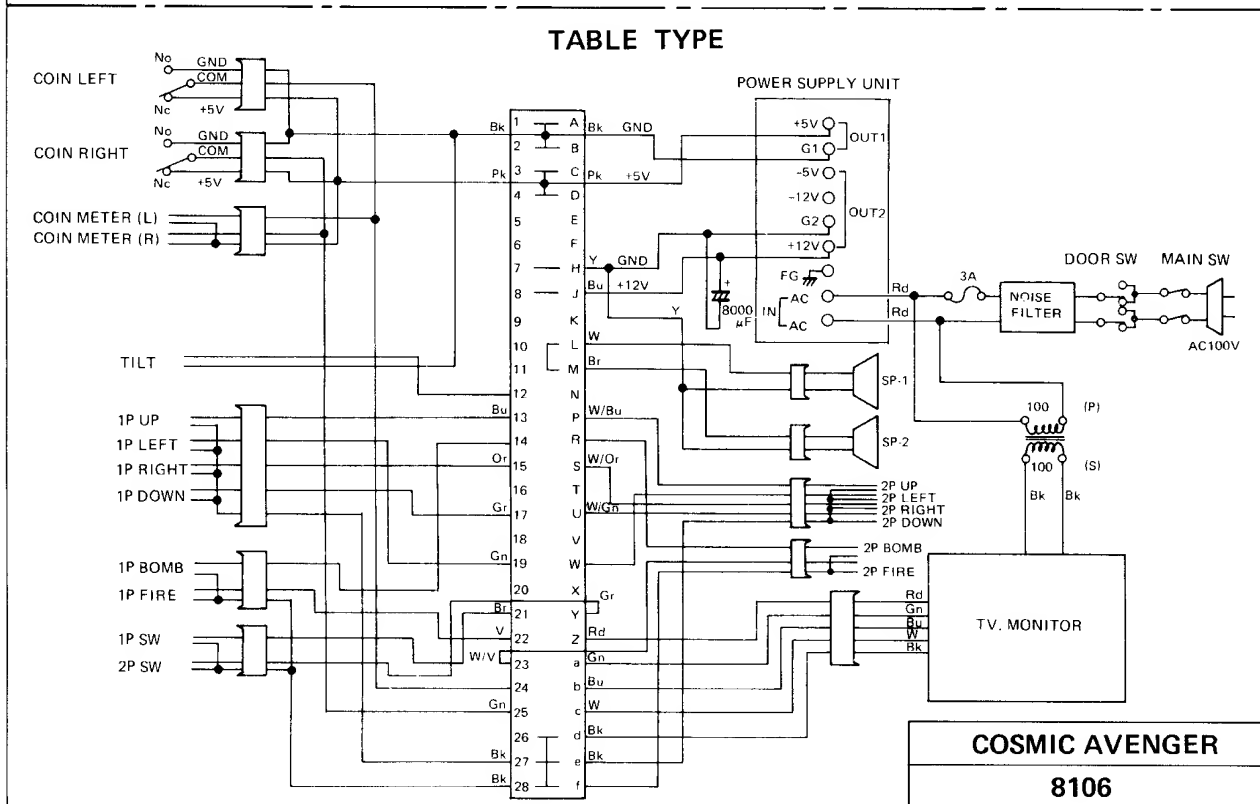
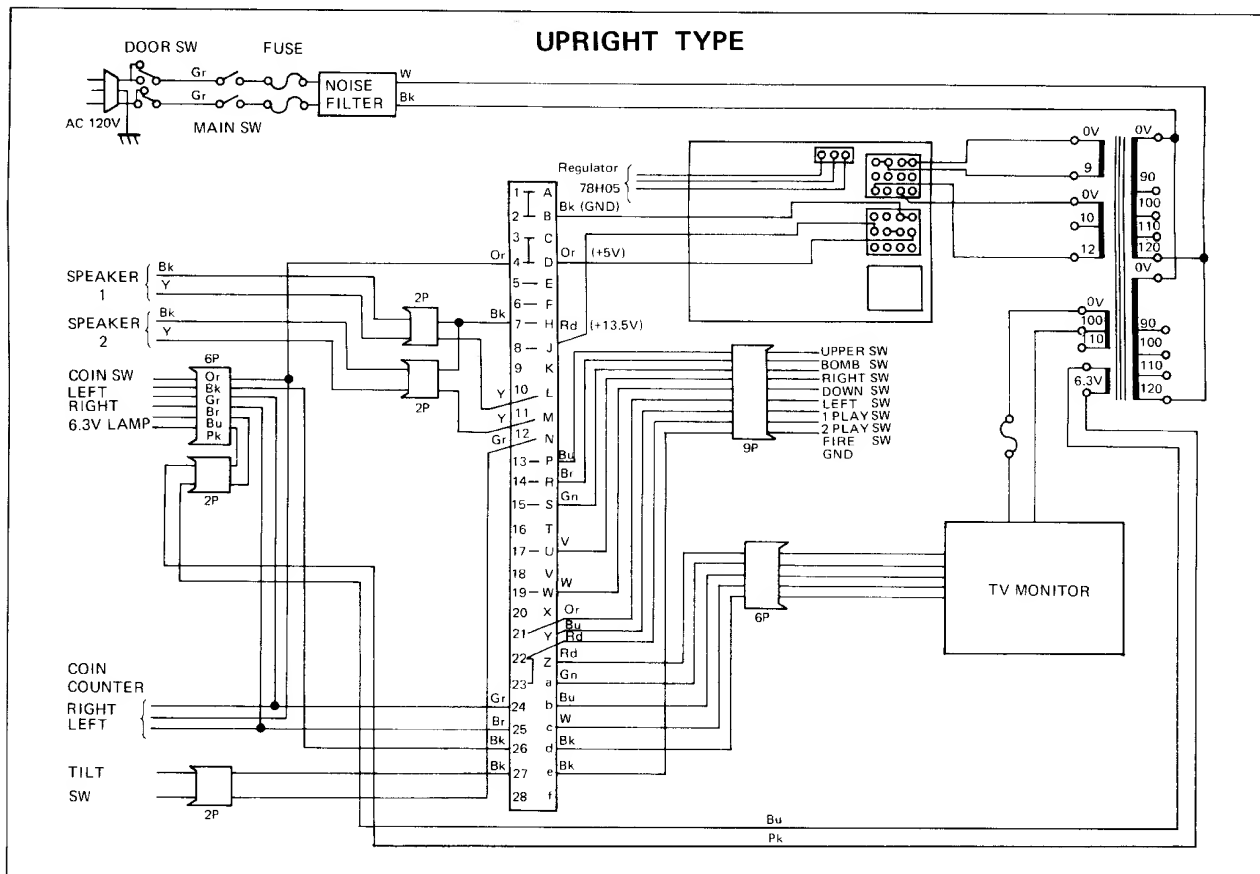
| Item No. | Q'ty | Description |
|-----------|------|---------------------------|
| 2J-103 | 1 | Mylar Capacitor |
| 224 | 4 | " 50V |
| 332 | 1 | " " |
| 104 | 1 | " " |
| 103 | 4 | " " |
| 102 | 1 | " " |
| 222 | 2 | Ceramic Capacitor AC1.5KV |
| 102 | 1 | " AC200V |
| 330 | 1 | Electrolytic 200V |
| 1000 | 2 | " 25V |
| 470 | 1 | " " |
| 22 | 1 | " " |
| 220 | 2 | " 16V |
| 47 | 1 | " " |
| 2200 | 3 | " 6.3V |
| 100 | 1 | " " |
| S4VB40 | 1 | Silicon Stack |
| S1VB10 | 1 | " |
| CTU-32S | 1 | " |
| 1S953 | 4 | Silicon Diode |
| SR1K-400 | 2 | " |
| 30DF-1 | 4 | " |
| 10DF-1 | 2 | " |
| SC-02-101 | 1 | Choke Coil |
| SN-8D-500 | 2 | " |
| SKP-1-50 | 1 | " |
| SKP-5-50 | 1 | " |
| HA17524P | 1 | IC |
| -7905C | 1 | " |
| 7912 | 1 | " |
| 7812 | 1 | " |
| 2SC2335 | 2 | Transistor |
| 2SA733P | 2 | " |

| Rating | Q'ty | Description |
|--------|------|--------------------------|
| 700Ω | 2 | Oxide Film Resistance 3B |
| 24Ω | 1 | " 3B |
| 47Ω | 1 | " 2B |
| 75KΩ | 1 | " 1B |
| 1KΩ | 1 | " " |
| 10Ω | 1 | " " |
| 5.1Ω | 3 | Carbon Resistance ¼W |
| 15Ω | 2 | " " |
| 51Ω | 2 | " " |
| 100Ω | 2 | " " |
| 240Ω | 1 | " " |
| 510Ω | 2 | " " |
| 5.1KΩ | 4 | " " |
| 22KΩ | 1 | " " |
| 51KΩ | 1 | " " |

Misc

| Name | Q'ty | Description |
|--------------------|-------|-------------|
| VR | 1 | 1KΩ |
| Manganin Line | 70m/m | |
| Output Transformer | 1 | |
| Pulse Transformer | 2 | |
| Power Transformer | 1 | |
| Thermistor | 1 | 8D-13 |
| Fuse | 1 | 3A |

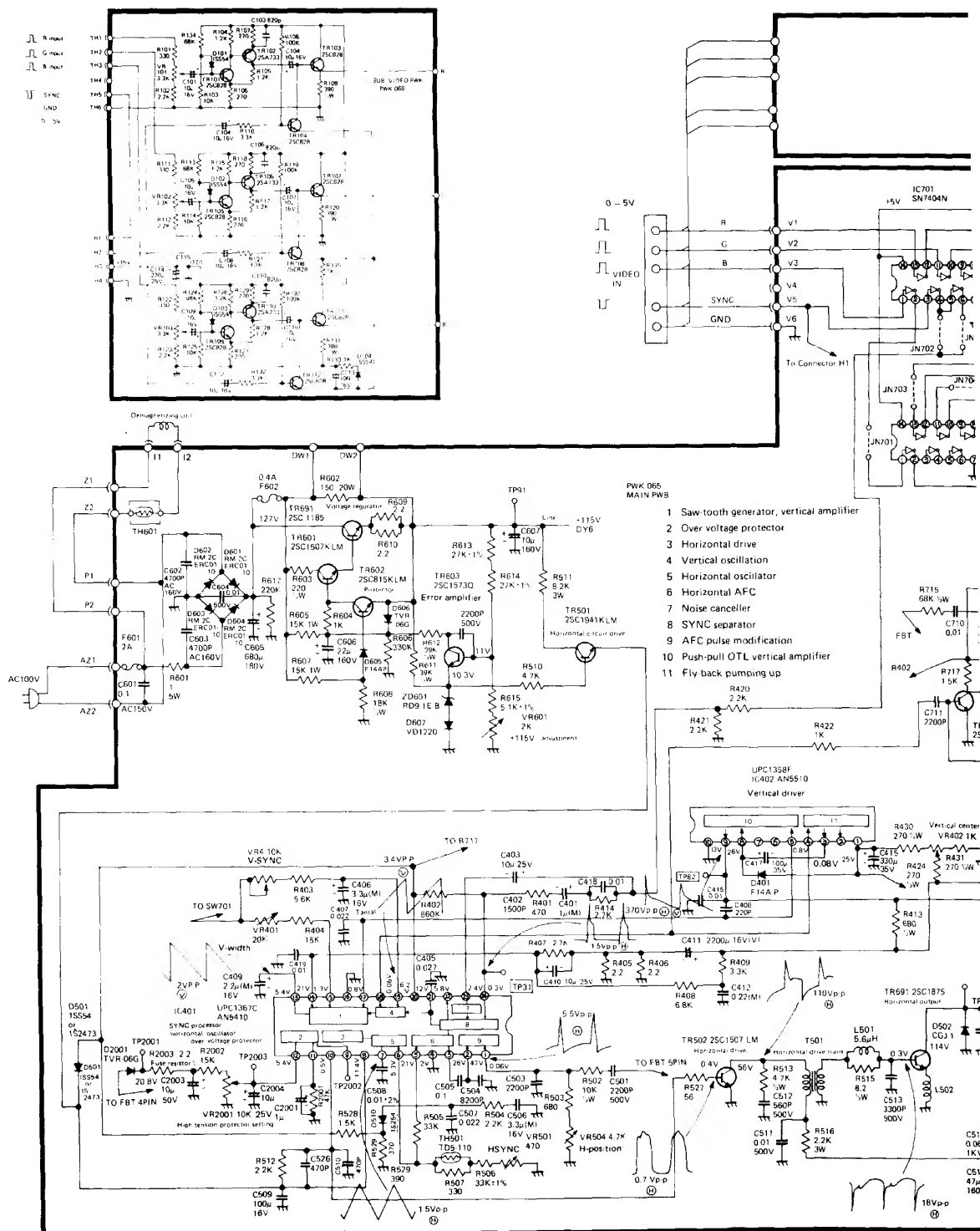
WIRING DIAGRAM (CONNECTOR)

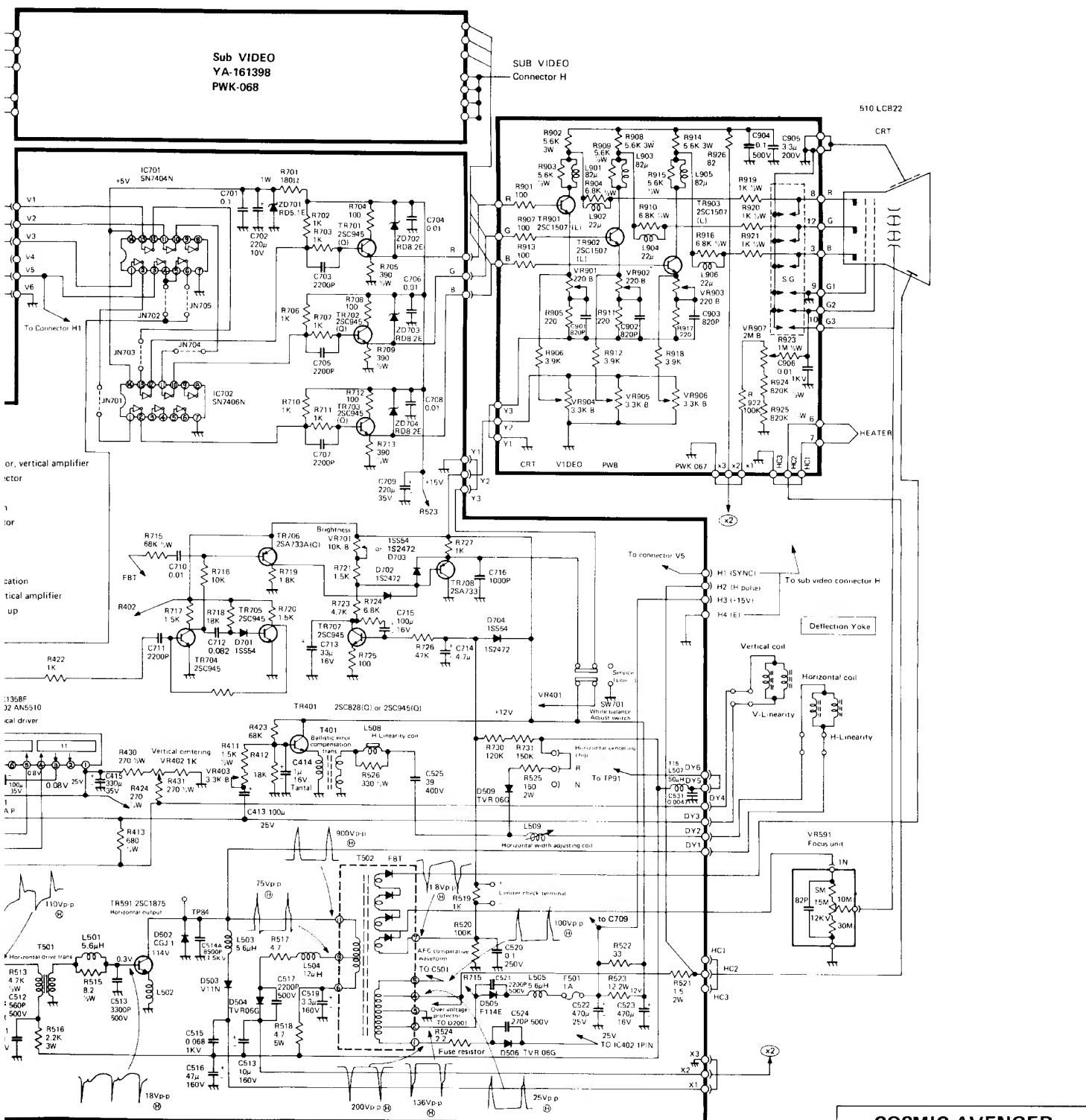


COSMIC AVENGER

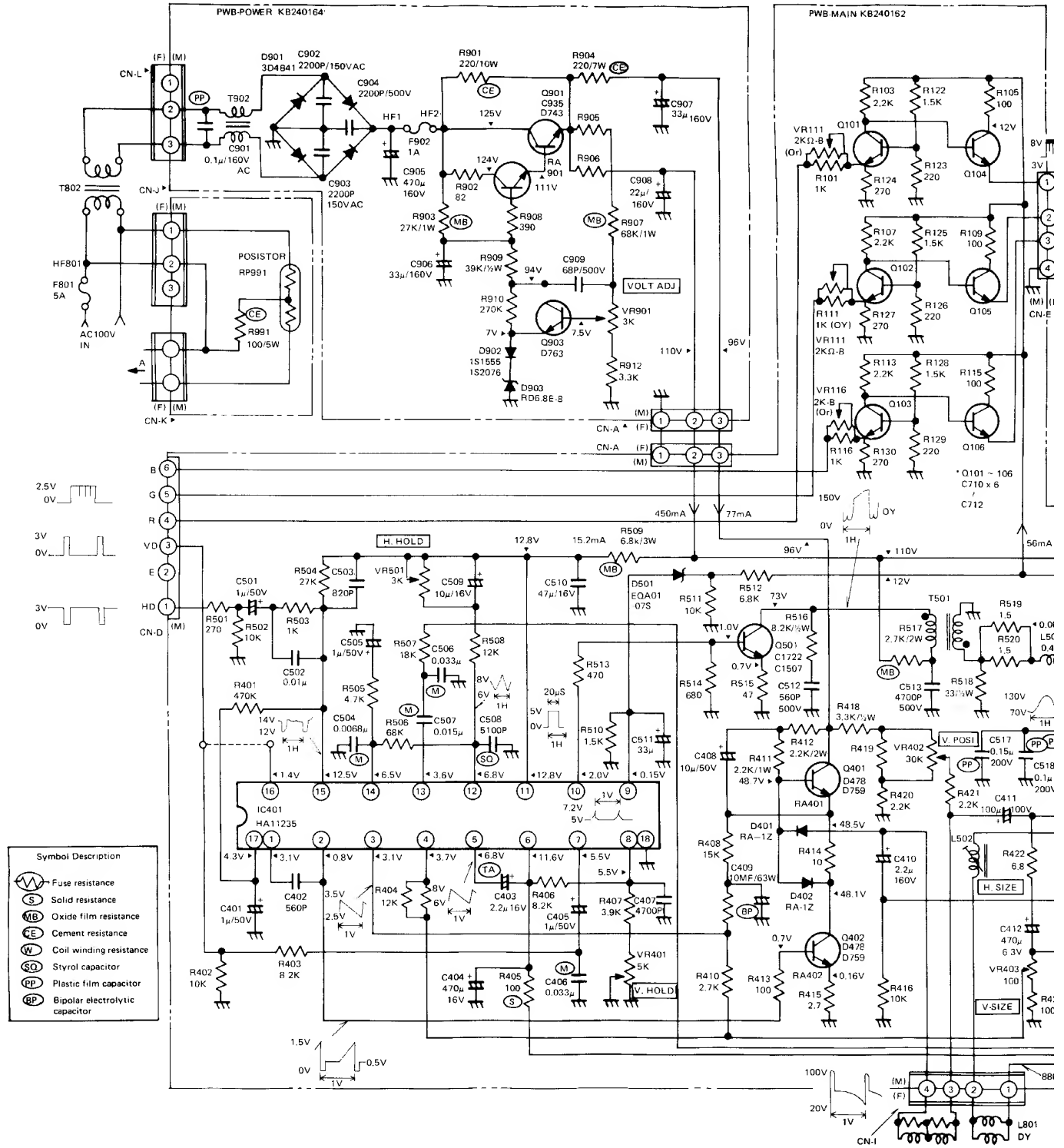
8106

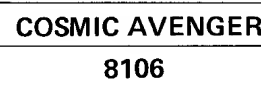
SCHEMATIC DIAGRAM (20" color)



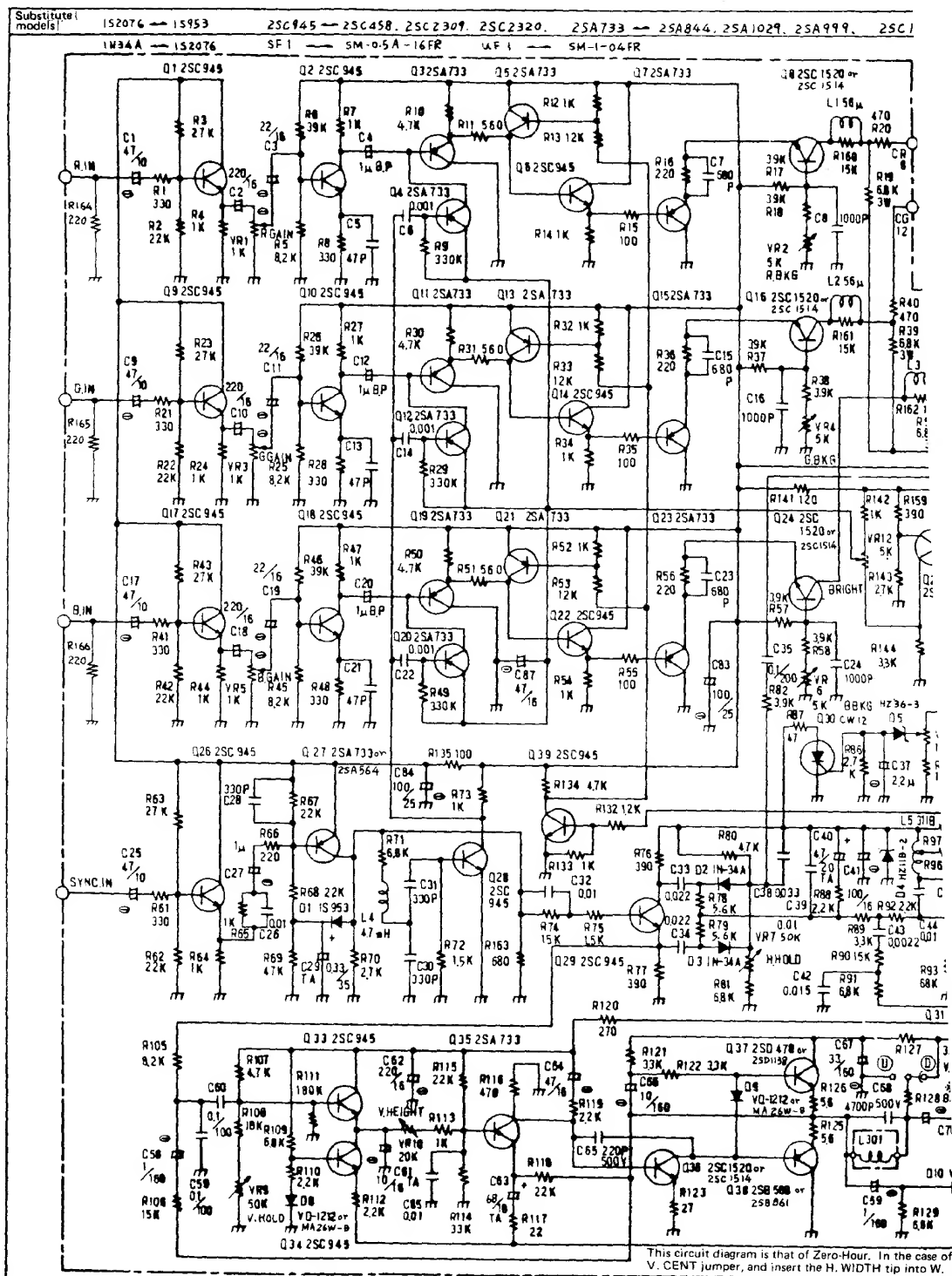


SCHEMATIC DIAGRAM (20" color)

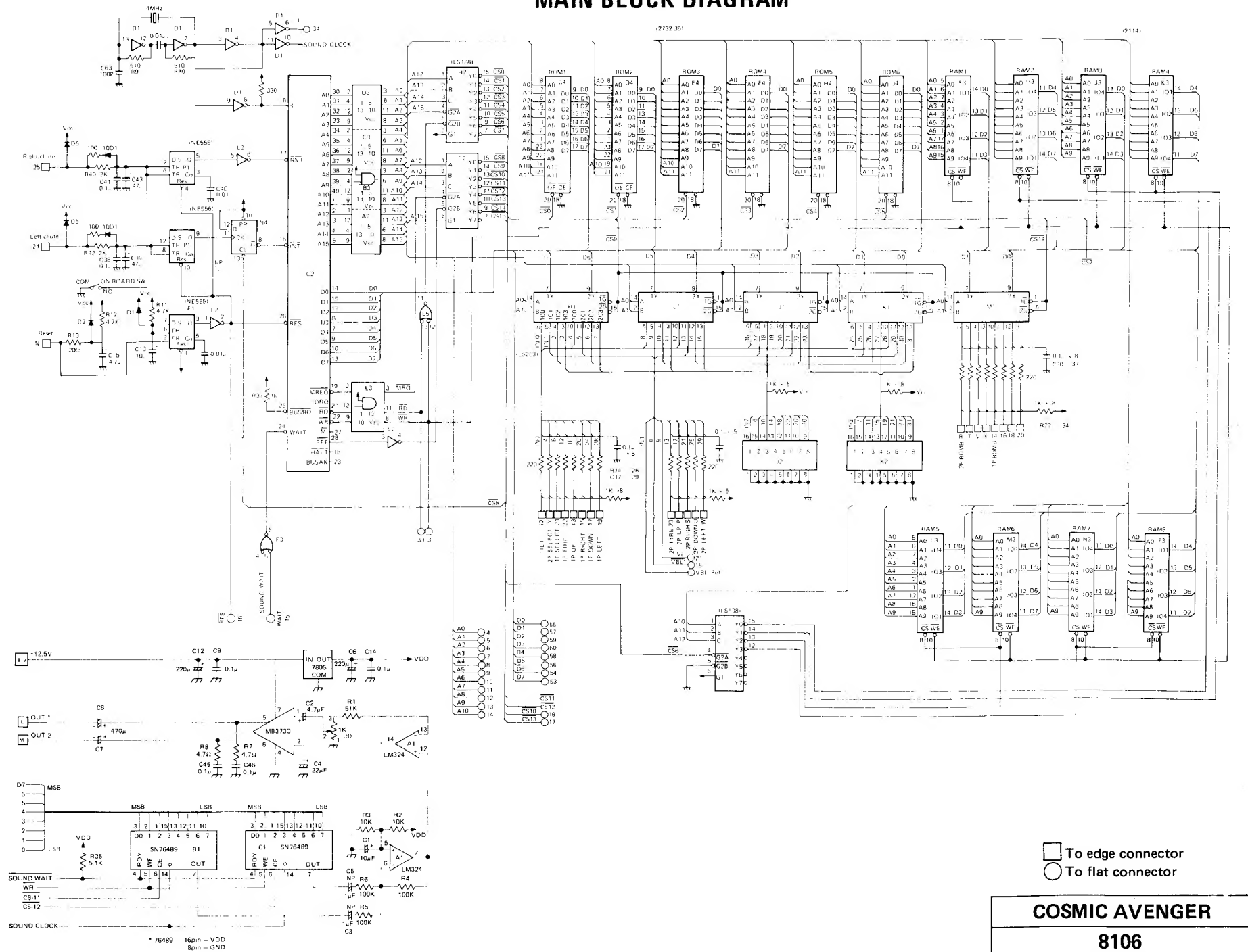




SCHEMATIC DIAGRAM (14" color)

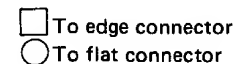


MAIN BLOCK DIAGRAM



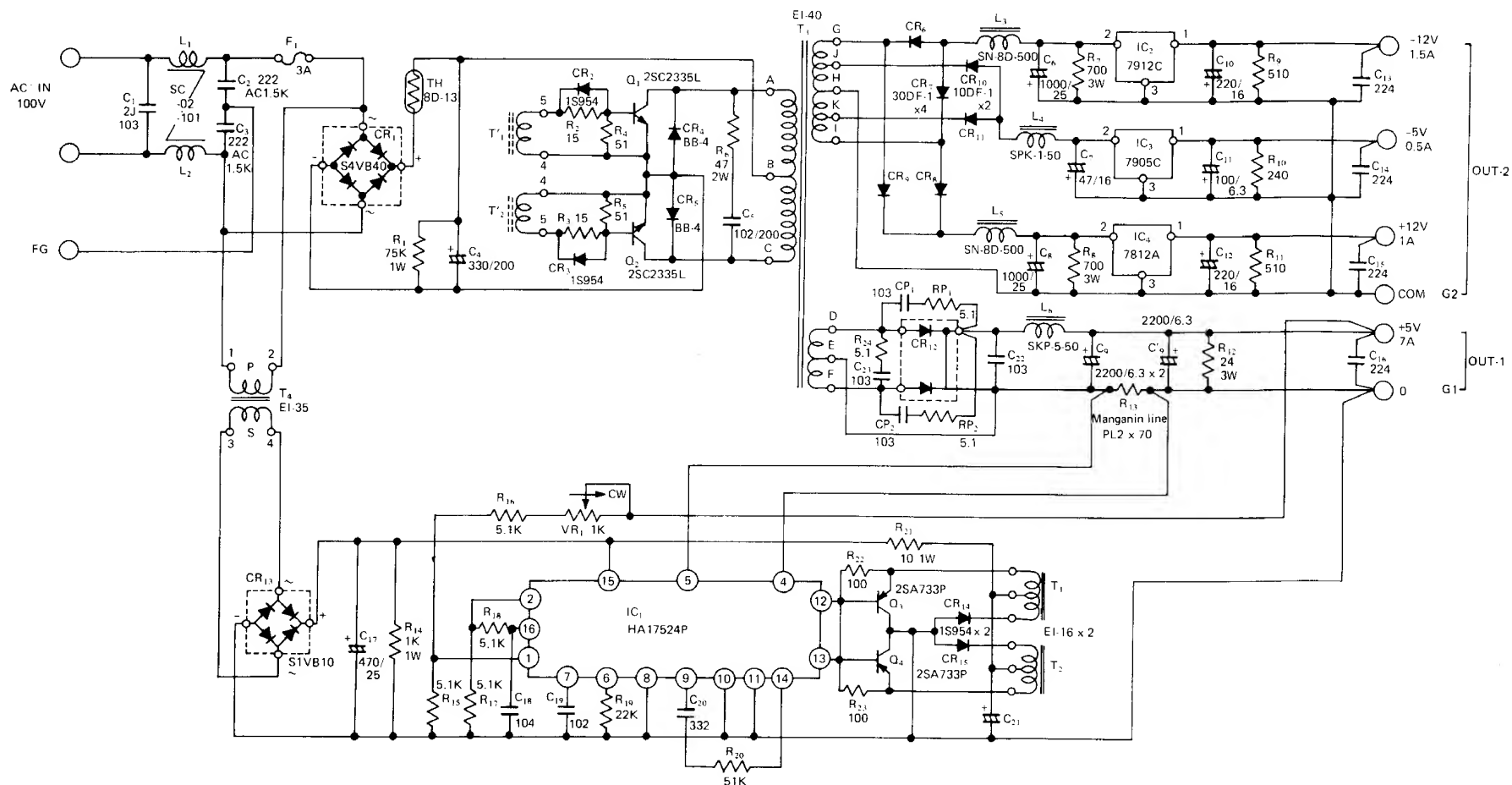
COSMIC AVENGER

8106



8106

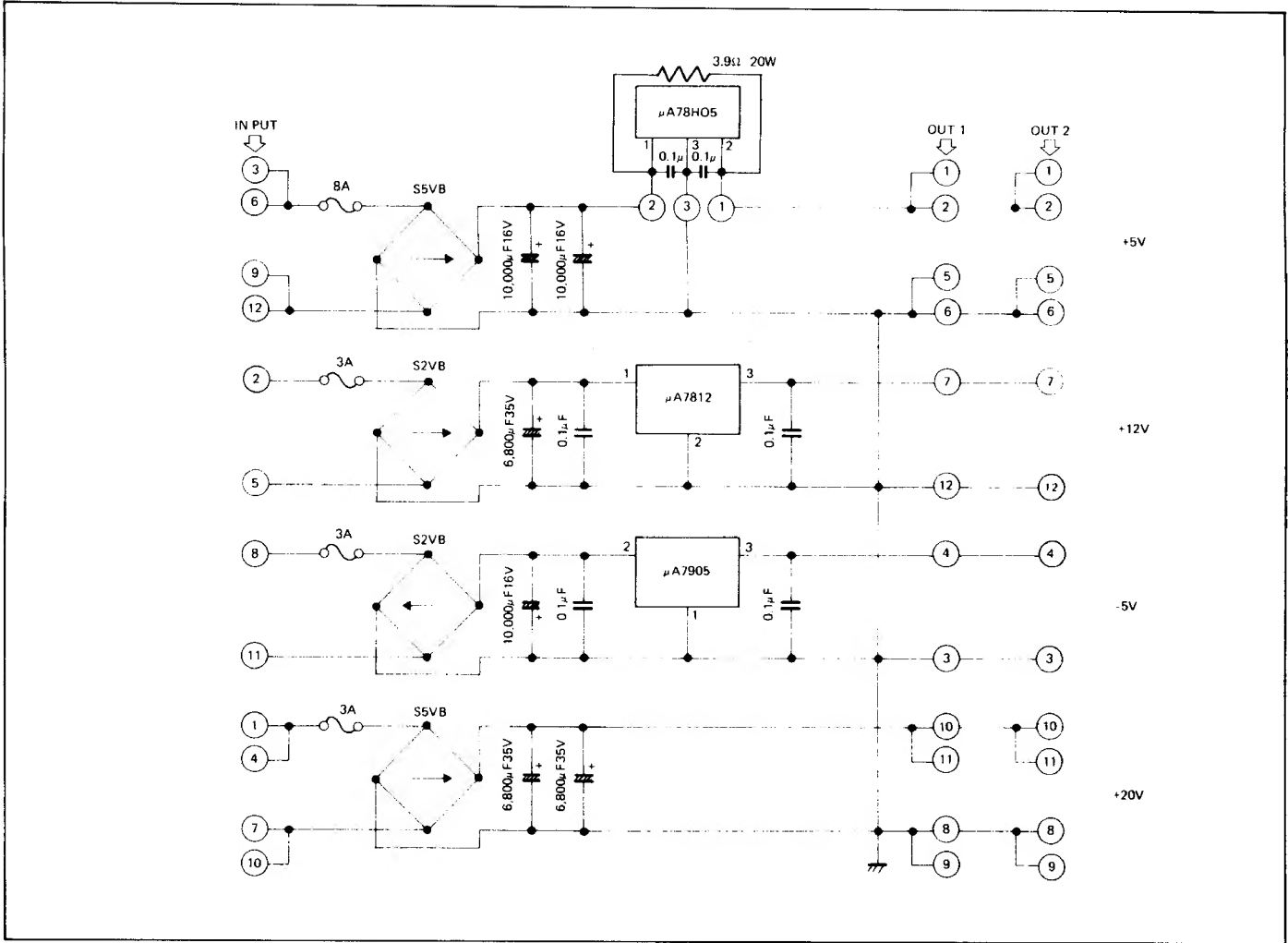
POWER SOURCE BLOCK DIAGRAM (Table type)



COSMIC AVENGER

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POWER SOURCE BLOCK DIAGRAM (Upright type)



BLOCK DIAGRAM

